

REMARKS

Claims 1-16 and 18-20 are pending. By this amendment, Figure 2 is amended; the specification is amended; and claim 19 is amended. Reconsideration in view of the above amendments and following remarks is respectfully requested.

The drawings were objected to under 37 C.F.R. §1.83(a). Figure 2 has been amended in accordance with the suggestion of the Office Action. The amendments to Figure 2 are supported by the application as originally filed, for example, by original claim 11.

Reconsideration and withdrawal of the objection under 37 C.F.R. §1.83(a) are respectfully requested.

Claim 19 was objected to. Claim 19 has been amended to change "detecting" to - - detection - - to provide antecedent basis for the claimed three position detection devices. With respect to the objection that the arrangement of the three position detection devices orthogonally with respect to each other is not possible in a plane, Applicants respectfully note that claim 19 does not recite that the three position detecting devices are arranged in a plane.

Reconsideration and withdrawal of the objection to claim 19 are respectfully requested.

The undersigned notes that the rejection of claims 5 and 9 is improper as it fails to present a proper *prima facie* case of obviousness for the following reasons. Claim 5 depends from claim 1. Claim 1 was rejected under 35 U.S.C. §103(a) over Van Den Brink (U.S. Patent 5,801,832) in view Kanaya et al. (U.S. Patent 5,995,222) and Ferraro et al. Claim 5, however, was rejected under 35 U.S. §103(a) over Van Den Brink in view of Ferraro et al. and further in view of Gallagher (U.S. Patent 5,811,816). The rejection of claim 5 fails to present a *prima facie* case of obviousness and is improper as it fails to include the features disclosed by Kanaya et al., which was used in the rejection of claim 1. As the rejection of claim 5 does not include all of the claimed features, namely, those allegedly disclosed or suggested by Kanaya et al., the rejection of claim 5 is improper and must be withdrawn. Similarly, claim 9 was rejected under 35 U.S.C. §103(a) over Van Den Brink and Ferraro et al. As claim 9 depends from claim 1 and includes all the features thereof, any rejection of claim 9 under 35 U.S.C. §103(a) must include Kanaya et al. as that reference was applied against claim 1. As Kanaya et al. was not applied against claim 9, the rejection fails to present a *prima facie* case of obviousness, is improper, and must be withdrawn.

Claims 1-3, 6, 7, 10, 12-16, 18 and 20 were rejected under 35 U.S.C. §103(a) over Nishi (U.S. Patent 6,331,885) in view of Kanaya et al. and Ferraro et al. The rejection is respectfully traversed.

The instant application was filed December 20, 2000 and claims priority to European Application 99310407.4, filed December 22, 1999. A certified copy of the European application, in English, was filed with the application on December 20, 2000 and receipt of such certified copy was acknowledged in the Office Action dated October 8, 2002. Accordingly, Applicants have established a date of invention, at the latest, of December 22, 1999, the filing date of the European application.

Nishi '885 issued from U.S. Application 09/525,732, filed March 14, 2000. The U.S. application was a continuation-in-part of international application PCT/JP98/04223, filed September 18, 1998. PCT/JP98/04223 published as WO 99/16113 on April 1, 1999, in Japanese. A copy of the first three pages of WO 99/16113 is enclosed. As PCT/JP 98/04223 was not filed before November 29, 2000 and was not published in English, Nishi '885 cannot rely on the filing date of international application PCT/JP98/04223 for an effective prior art date under 35 U.S.C. §102(e). Nishi '885 thus has an effective prior art date under 35 U.S.C. §102(e) as of the filing date of U.S. Application 09/525,732, which is March 14, 2000. As Applicants have established a date of invention of at least as late as December 22, 1999 through the submission of their priority document, Nishi '885 is not prior art under 35 U.S.C. §102(e) as its effective prior date, March 14, 2000, is after Applicants' established date of invention.

Reconsideration and withdrawal of the rejection of claims 1-3, 6, 7, 10, 12-16, 18 and 20 under 35 U.S.C. §103(a) over Nishi '885 in view of Kanaya et al. and Ferraro et al. are respectfully requested.

As no valid objections or prior art rejections have been applied against claims 18-20, Applicants respectfully submit that those claims are allowable and request indication of such in the next Office Action.

Claims 1-3, 6, 7, 10 and 12-16 were rejected under 35 U.S.C. §103(a) over Nishi '195 in view of Kanaya et al. and Ferraro et al. In addition, claims 1-4, 6-8, 10 and 12-16 were rejected under 35 U.S.C. §103(a) over Van Den Brink in view of Kanaya et al. and Ferraro et al. The rejections are respectfully traversed.

As discussed on pages 3 and 4 of the Amendment filed November 18, 2002, Nishi '195 does not disclose or suggest a position detection device as recited claims 1 and 15, nor does Nishi '195 disclose or suggest a method a determining a reference a position of a movable object table, as recited in claims 12 and 16. The system of Nishi '195 is nothing more than what is disclosed as prior art in the instant specification on page 3, lines 27-34.

Van Den Brink also fails to disclose or suggest a position detection device as recited in claims 1 and 15 and a method of determining a reference position of a movable object table as recited in claims 12 and 16. Van Den Brink discloses nothing more than a known prior art system in which an alignment device uses two alignment beams for aligning a substrate alignment mark on a mask alignment mark. The interferometers of Van Den Brink do not detect a position, they do nothing more than measure a change in position from an aligned position.

Ferraro et al. fail disclose or suggest a position detection device as recited in claims 1 and 15 and a method of determining a reference position of a movable object table as recited in claims 12 and 16.

Kanaya et al., newly cited in the January 16, 2003 Office Action, discloses a subject positioning device for an optical interferometer which divides a light beam into an object beam and a reference beam by a beam splitter and directs the object and reference beams to a test surface of a subject in a reference surface, respectively. Kanaya et al. thus is similar to Nishi '195 and Van Den Brink in that they disclose nothing more than a known prior art interferometer system which determines a change in position from a known reference position. The interferometer of Kanaya et al. is not a position detection device.

As neither Nishi '195, Van Den Brink, Kanaya et al. nor Ferraro et al. disclose or suggest a position detection device as recited in claims 1 and 15 or a method of determining a reference position of a movable object table, any combination of the references fails to present a *prima facie* case of obviousness against claims 1, 12, 15 and 16.

The Office Action on page 8, paragraph number 11 states "the recitation 'position detection device' has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness, but instead, the process steps or structural limitations are able to stand alone."

It is respectfully noted that in claim 1 the recitation of a "position detection device" does not occur in the preamble of the claim. It is also noted that MPEP §2111.02 states "the claim preamble must be read in the context of the entire claim. The determination whether preamble recitations are structural limitations or mere statements of purpose or use 'can be resolved only on review of the entirety of the [record] to gain an understanding of what the inventors actually invented and intended to accomplish by the claim'."

Claims 1, 12, 15 and 16 do not recite the purpose of a process or the intended use of a structure, they recite a position detection device including a radiation source mounted on a reference frame, a two-dimensional radiation detector mounted in a fixed position on the reference, and a mirroring device mounted on one of the object tables that is movable relative to the reference frame so as to reflect radiation emitted by the radiation source toward the radiation detector and a method of determining a reference position including emitting radiation from a radiation source mounted on the reference frame toward a mirroring device mounted on an object table, reflecting the radiation, and detecting the reflected radiation in a two-dimensional detector mounted in a fixed position on the reference frame.

Claims 1 and 15 are structurally different than the interferometer systems disclosed by Nishi '195 and Van Den Brink. Nishi '195 and Van Den Brink both fail to disclose or suggest the structure recited in claims 1 and 15. The examiner has acknowledged this failure by relying upon Kanaya et al. and Ferraro et al. to cure the structural deficiencies of Nishi '195 and Van Den Brink.

It is respectfully submitted, however, that the test for obviousness is not whether all of Applicants' recited structure features may be found in some combination of the prior art. A *prima facie* case of obviousness requires some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The motivation alleged by the examiner, that Ferraro et al. teach that a charged coupled device (CCD) provided advantages of low readout noise and high quantum efficiency and sensitivity in a wide wavelength range, would not have motivated one of ordinary skill in the art to modify Nishi '195 or Van Den Brink. One of ordinary skill in the art would not have modified the interferometers of Nishi '195 and Van Den Brink to use a two-dimensional radiation detector as interferometers simply do not use two-dimensional radiation to detect changes in position of an object from a zero or reference position. The combination proposed by the examiner is nothing more than impermissible hindsight reconstruction of Applicants' claimed invention.

The invention relates to a lithographic projection apparatus having a position device which is arranged for defining a reference position (absolute position) in six degrees of freedom with respect to a reference frame. The position device is provided with radiation sources, two-dimensional detectors and mirroring devices such as corner cubes. Two of the six degrees of freedom can be measured by measuring a displacement of a radiation beam in a corner cube. Thus, a simple but effective position device is obtained that can determine a reference position with an accuracy in the order of micrometers. The invention does not

relate to an alignment procedure. As is well known in the art, the detectors are not even suited for the required nanometer accuracy in alignment procedures.

Van Den Brink relates to an alignment procedure. During the alignment procedure relative positions are measured. The measurements are based on the principle of two gratings and corresponding light interference in order to obtain nanometer accuracy. Thus, Van Den Brink is not analogous to the present invention, except that a reference position obtained according to the present invention can, for example, be used during the alignment procedure.

Nishi '195 relates to an alignment procedure. During the alignment procedure relative positions are measured. The measurements are performed with an interferometer in order to obtain nanometer accuracy. Thus, Nishi '195 is not analogous to the present invention, except that a reference position obtained according to the present invention can, for example, be used during the alignment procedure.

Kanaya et al. relates to an alignment procedure. During the alignment procedure relative positions are measured. The measurements are performed with an interferometer in order to obtain the required accuracy in the order of nanometers. Thus, Kanaya et al. is not analogous to the present invention, except that a reference position obtained according to the present invention can, for example, be used during the alignment procedure.

Ferraro et al. is also not analogous to the present invention as it is not reasonably pertinent to the particular problem faced by Applicants, determining a position in six degrees of freedom with respect to a reference frame.

One of ordinary skill in the art would not have been motivated to combine Nishi '195 or Van Den Brink with Kanaya et al. and Ferraro et al. to solve the problem of determining a reference position in six degrees of freedom with respect to a reference frame as they are directed to alignment procedures. Even assuming the references were combined, the combination would not result in the claimed invention.

Reconsideration and withdrawal of the rejections under 35 U.S.C. §103(a) over Nishi '195 in view of Kanaya et al. and Ferraro et al. and Van Den Brink in view of Kanaya et al. and Ferraro et al. are respectfully requested.

Claims 2-4, 6-8, 10, 13 and 14 recite additional features of the invention are allowable for the same reasons discussed above with respect to claims 1, 12, 15 and 16 for the additional features recited therein.

The rejections of claims 5 and 9 fail to present a *prima facie* case of obviousness for the reasons discussed above and will not be addressed further except to note that with respect to claim 9, as argued on page 3 of the Amendment filed September 4, 2002, MPEP §2144.06

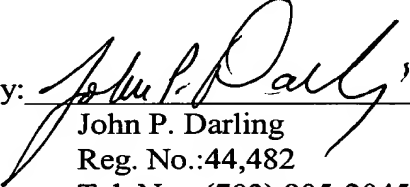
states that "In order to rely to equivalence as a rational supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on Applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents." The examiner is respectfully requested to recite at least one prior reference that recognizes the alleged equivalency of the claimed devices or withdraw the rejection.

Applicants appreciate the indication that claim 11 defines patentable subject matter. However, in view of the above amendments and remarks, Applicants respectfully submit that all the claims are allowable and that the entire application is in condition for allowance.

Should the examiner believe that anything further is desirable to place the application in better condition for allowance, the examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Pillsbury Winthrop LLP

By: 
John P. Darling
Reg. No.: 44,482
Tel. No.: (703) 905-2045
Fax No.: (703) 905-2500

JPD\tmt
P.O. Box 10500
McLean, VA 22102

(703) 905-2000

Enclosures:

Appendix (p. 9)

Request for Approval of Drawing Corrections w/Fig. 2

WO 99/16113 (3 pages)

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE DRAWINGS:

Figure 2 is amended as shown in the attached Request for Approval for Drawing Corrections.

IN THE SPECIFICATION:

The specification is amended as follows:

The whole paragraph beginning on page 10, line 21 is changed as follows:

Ideally, the positions of the radiation source/detector units on the metrology (reference) frame and the reflectors on the table are such that the table can be moved to a position where zero outputs are given for all six degrees of freedom simultaneously. (It should be noted though that the "zero" position need not be the position at which all detectors give their zero or mid range outputs; any repeatable and unique combination of output signals from the three 2-dimensional detectors can be defined as the zero position.) In other words, the capture zones of all the detection apparatus 10A, 10B, 10C should overlap. However, it may not always be possible because of the requirements of other components of the device to arrange this. In that case, the table may be moved between the capture zones of each of apparatus 10A, 10B, 10C and position signals from the incremental detector indicating the movement of the table between specific positions as indicated by the reference detection apparatus 10A, 10B, 10C used to determine the zero reference position. Output signals OS from the position detecting apparatus 10A, 10B, 10C and the interferometers IF are combined by a combiner CB to determine an absolute position of the table.

IN THE CLAIMS:

Claim 19 is amended as follows:

19. (Amended) Apparatus according to claim 18, wherein the three position [detecting] detection devices are arranged orthogonally with respect to each other.

End of Appendix



<p>(51) 国際特許分類6 H01L 21/027, 21/68, G03F 7/20</p>	<p>A1</p>	<p>(11) 国際公開番号 WO99/16113</p> <p>(43) 国際公開日 1999年4月1日(01.04.99)</p>											
<p>(21) 国際出願番号 PCT/JP98/04223</p> <p>(22) 国際出願日 1998年9月18日(18.09.98)</p> <p>(30) 優先権データ</p> <table border="0"> <tr> <td>特願平9/273420</td> <td>1997年9月19日(19.09.97)</td> <td>JP</td> </tr> <tr> <td>特願平9/279500</td> <td>1997年9月26日(26.09.97)</td> <td>JP</td> </tr> <tr> <td>特願平9/293249</td> <td>1997年10月10日(10.10.97)</td> <td>JP</td> </tr> <tr> <td>特願平10/226500</td> <td>1998年7月27日(27.07.98)</td> <td>JP</td> </tr> </table> <p>(71) 出願人 (米国を除くすべての指定国について) 株式会社 ニコン(NIKON CORPORATION)[JP/JP] 〒100-8331 東京都千代田区丸の内3丁目2番3号 Tokyo, (JP)</p> <p>(72) 発明者 ; および</p> <p>(75) 発明者 / 出願人 (米国についてのみ) 西 健爾(NISHI, Kenji)[JP/JP] 〒100-8331 東京都千代田区丸の内3丁目2番3号 株式会社 ニコン内 Tokyo, (JP)</p> <p>(74) 代理人 弁理士 川北喜十郎, 外(KAWAKITA, Kijuro et al.) 〒160-0022 東京都新宿区新宿五丁目1番15号 新宿MMビル Tokyo, (JP)</p>	特願平9/273420	1997年9月19日(19.09.97)	JP	特願平9/279500	1997年9月26日(26.09.97)	JP	特願平9/293249	1997年10月10日(10.10.97)	JP	特願平10/226500	1998年7月27日(27.07.98)	JP	<p>(81) 指定国 AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HR, HU, ID, IL, IS, KR, LC, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, ARIPO特許 (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), ユーラシア特許 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 欧州特許 (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI特許 (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>添付公開書類 国際調査報告書</p>
特願平9/273420	1997年9月19日(19.09.97)	JP											
特願平9/279500	1997年9月26日(26.09.97)	JP											
特願平9/293249	1997年10月10日(10.10.97)	JP											
特願平10/226500	1998年7月27日(27.07.98)	JP											
<p>(54)Title: STAGE DEVICE, A SCANNING ALIGNER AND A SCANNING EXPOSURE METHOD, AND A DEVICE MANUFACTURED THEREBY</p> <p>(54)発明の名称 ステージ装置、走査型露光装置及び方法、並びにそれから製造されたデバイス</p> <p>(57) Abstract</p> <p>The Y-axis direction position of the stage (WST) is directly measured by an interferometer (76Y). The X-axis direction position of the stage (WST) is determined by performing calculation based on the values measured by first and third interferometers (76X1, 76X2) for measuring the position of the stage (WST) in different directions. First to third reflecting surfaces (60a, 60b, 60c) are arranged in a triangle to allow use of a triangle stage (WST), which reduces the size and weight of the stage compared with a conventional rectangular stage. When transferring a mask pattern onto a plurality of shot areas (S1, S2) on the substrate sequentially, the throughput can be improved by performing the prescan of the shot area (S21) and the stepping operation of the shot area (S2) parallelly.</p> <div data-bbox="893 1302 1396 1848"> </div>													

Y軸方向のステージW S Tの位置を干渉計7 6 Yにより直接計測し、X軸方向については、異なる方向からステージW S Tの位置を計測する第1、第3の干渉計7 6 X 1、7 6 X 2の計測値に基づいて演算によりステージW S Tの位置を求める。第1ないし第3の反射面6 0 a、6 0 b、6 0 cを三角形形状に配置することにより、ステージW S Tとして三角形形状のものを使用することが可能となるので、従来の矩形のステージに比べてステージを小型・軽量化することができる。また、基板上の複数のショット領域S 1、S 2に順次マスクのパターンを転写する場合、ショットS 2のプリスキャンと、ショットS 2へのステッピング動作とを並行して行うことによってスループットを向上することができる。

PCTに基づいて公開される国際出願のパンフレット第一頁に掲載されたPCT加盟国を同定するために使用されるコード(参考情報)

AE アラブ首長国連邦	ES スペイン	LI リヒテンシュタイン	SG シンガポール
AL アルバニア	FI フィンランド	LK スリ・ランカ	SI スロヴェニア
AM アルメニア	FR フランス	LR リベリア	SK スロヴァキア
AT オーストリア	GA ガボン	LS レソト	SL シェラ・レオネ
AU オーストラリア	GB 英国	LT リトアニア	SN セネガル
AZ アゼルバイジャン	GD グレナダ	LU ルクセンブルグ	SZ スワジランド
BA ボスニア・ヘルツェゴビナ	GE グルジア	LV ラトヴィア	TD チャード
BB バルバドス	GH ガーナ	MC モナコ	TG トーゴ
BE ベルギー	GM ガンビア	MD モルドヴァ	TJ タジキスタン
BF ブルギナ・ファソ	GN ギニア	MG マダガスカル	TM トルクメニスタン
BG ブルガリア	GW ギニア・ビサウ	MK マケドニア旧ユーゴスラヴィア	TR トルコ
BJ ベナン	GR ギリシャ	共和国	TT トリニダード・トバゴ
BR ブラジル	HU ハンガリー	ML マリ	UA ウクライナ
BY ベラルーシ	ID インドネシア	MN モンゴル	UG ウガンダ
CA カナダ	IE アイルランド	MR モーリタニア	US 米国
CF 中央アフリカ	IL イスラエル	MW マラウイ	UZ ウズベキスタン
CG コンゴ	IN インド	MX メキシコ	VN ヴィエトナム
CH スイス	IS アイスランド	NE ニジェール	YU ユーゴスラビア
CI コートジボアール	IT イタリア	NL オランダ	ZA 南アフリカ共和国
CM カメルーン	JP 日本	NO ノールウェー	ZW ジンバブエ
CN 中国	KE ケニア	NZ ニュー・ジーランド	
CU キューバ	KG キルギスタン	PL ポーランド	
CY キプロス	KP 北朝鮮	PT ポルトガル	
CZ チェッコ	KR 韓国	RO ルーマニア	
DE ドイツ	KZ カザフスタン	RU ロシア	
DK デンマーク	LC セントルシア	SD スーダン	
EE エストニア		SE スウェーデン	

明細書

ステージ装置、走査型露光装置及び方法、並びにそれから製造されたデバイス

技術分野

本発明は、半導体回路素子や液晶表示素子等の回路デバイスをリソグラフィ工程で製造する際に用いられる走査型露光装置及び走査露光方法に関し、さらに詳細には、9インチ以上の大型マスクを用いた走査露光に好適な走査型露光装置及び露光方法並びにそれにより製造されたデバイスに関する。

特に、本発明は、後述する発明の共通目的の下、概ね次の5つの概念を包含する。第1の概念は、大型のパターンまたは区画された複数のパターンを有するマスクと基板と同期移動して、大型のパターンを基板上につなぎ合わせてあるいは該複数のパターンを基板の同一のエリアに重ねて転写する走査露光方法及び装置に関し、第2の概念は、ステージの移動方向に対して斜めに延在する反射鏡とそれに測長ビームを送光する干渉計を有するステージ装置、例えば三角形形状のステージ及びそれを含む走査露光装置に関し、第3の概念は、定盤上に、第2可動体及び第1可動体をそれぞれ浮上させて支持する偏荷重防止ステージ装置及びそれを含む走査露光装置に関し、第4の概念は、マスクと基板を同期して移動する走査露光において、基板上に区画されたある領域を走査露光した後であって次の区画領域を走査露光するときに、走査方向と直交する方向における基板のステップ移動（ステッピング）と走査方向における基板のスキャンニング移動のタイミング制御に関し、第5の概念は、走査露光においてマスクと基板を同期させるための整定時間を短縮するためにマスクまたは基板移動時の加速度を制御することに関する。これらの概念の具体的な説明を、本書の「発明を実施するための最良の形態」の欄の冒頭に記載した。